

REMARKS

Claims 1-14 remain pending in the application.

Claims 1-14 over Myers in view of Matsumoto

In the Office Action, claims 1-14 were rejected under 35 U.S.C. §103(a) as allegedly being obvious over Myers, U.S. Patent No. 4,817,149 ("Myers") in view of Matsumoto et al., U.S. Patent No. 5,381,482 ("Matsumoto"). The Applicant respectfully traverses the rejection.

Claims 1-6 recite a first digital delay module providing a choice of digital delay within a first digital resolution integer value for use in a 3D audio sound system. Claims 7-14 recite selecting one of a plurality of available first integer value digital time delays having a first digital resolution between each of a plurality of available first digital time delays.

In the Response to Arguments on page 7 of the Office Action, the Examiner alleges that Myers discloses digital operations and that A/D and D/A converters are well known in the art. However, the Examiner agrees to the Applicants' arguments on page 3 of the Office Action, acknowledging that "Myers does not teach that the first delay takes a digital integer value, nor does Myers explicitly teach that the first and second time delays operate in digital fashion".

The Applicant is not arguing that Myers fails to disclose digital operations and that A/D and D/A converters are well known in the art, even though Myers fails to disclose use of A/D and D/A converts. However, as the Examiners acknowledged, Myers fails to disclose the first delay an integer value digital time delay, much less a choice of an integer value digital time delay and selecting one of an integer value digital time delay, as recited by claims 1-14.

In the Response to Arguments on page 8 of the Office Action, the Examiner alleges "Matsumoto teaches the digital integer delay 40 (see fig. 4) is in series with digital fractional delay 32 which is added by 40 and passes thought 23 and 20 to produce output from 6, thus creating a positional sound as recited by claims 1-14 (see col. 9, line 54-col. 10 line 38)".

The Applicant agrees with the Examiner's interpretation of Matsumoto. However, the claims 1-14 respectively recite a first digital delay module providing a choice of digital delay within a first digital resolution integer value for use in a 3D audio sound system and selecting one of a plurality of available first digital integer value time delays having a first digital resolution between each of a plurality of available first digital time delays. Although Myers discloses a digital integer delay, Matsumoto discloses a single fixed digital integer delay. Thus, neither Myers nor Matsumoto disclose or suggest a choice of an integer value digital delay and selecting one of a plurality of integer value digital time delay, as respectively recited by claims 1-14.

Thus, Myers modified by the disclosure of Matsumoto still fails to disclose an integer value digital delay having plurality of digital integer delay values, i.e., a first digital delay module providing a choice of digital delay within a first digital resolution integer value for use in a 3D audio sound system and selecting one of a plurality of available first integer value digital time delays having a first digital resolution between each of a plurality of available first digital time delays, as respectively recited by claims 1-14.

In the Response to Arguments on page 9 of the Office Action, the Examiner alleges "that the combination of Mayers and Matsumoto provides two digital delays, an integer and a fractional, added together, as discussed in the rejection of claim 1 and response above, therefore, providing the same advantages over the prior art systems." The Applicants respectfully disagree.

As discussed above, neither Myers nor Matsumoto disclose use of a digital delay module that has a choice of an integer value digital time delay and selecting one of a plurality of available first integer value digital time delays. Myers modified by the disclosure of Matsumoto would result in Myers relying on a fixed value integer digital delay. Thus, even if it were obvious to modify Myers with the disclosure of Matsumoto (which it is not), and the theoretical result produced what the Examiner alleges, i.e., two digital delays, an integer and a fractional, added together, the theoretical result would still fail to disclose a system and method comprising a digital delay module that has a choice of an integer value digital time delay and selecting one of a plurality of

available first integer value digital time delays, as respectively recited by claims 1-14.

The claimed features have advantages over the cited prior art, contrary to the Examiner's allegation that Myers modified by the disclosure of Matsumoto provides the same advantages over the prior art systems. The Applicant's claimed features rely on digital delay values that, e.g., can produce a much wider range of delays than a analog system that relies on individual components to produce each delay value. Moreover, a sound system that can select from a plurality of available first digital integer value time delays can, e.g., greatly increase the depth of sound from a 3D audio sound system. By adding a selected digital integer delay with a selected fractional digital delay, the Applicant's sound system can greatly increase accuracy of sound produced over the cited prior art.

Furthermore, with a conventionally proposed implementation of a digital 3D sound system to provide a more accurate ITD based on the given resolution has been to interpolate an entire head-related transfer function (HRTF) set such that the ITD becomes interpolated as well. Unfortunately, interpolation itself can become a computationally intense requirement which likely adds to, rather than cures, the computational inefficiency otherwise associated with digital 3D sound systems. Applicant's invention overcomes the deficiencies in the cited prior art by using two digital delays, a choice of a digital integer delay and a choice of a digital fractional delay, added together to created a perceived positional sound.

As discussed in the background of the invention, conventional 3D sound systems employing delay use analog components. There are at least two basic problems with the implementation of the conventional analog approach in a digital environment. First of all, a large resolution in the available time delays cause discretely sampled interaural time differences for the expected position of a listener. Thus, a 'closest' or 'best fit' interaural time difference (ITD) must be chosen, which may be up to 50% away from the ideal parameter. This may cause a jittering effect in the sense of movement of the sound by the listener. Moreover, implementation of a digital filter emulating an analog filter having

multiple taps (as shown Applicant's Fig. 6) is computationally involved, providing a level of system inefficiency from a computational view.

Moreover, "Teachings of references can be combined only if there is some suggestion or incentive to do so." In re Fine, 5 USPQ2d 1596,1600 (Fed. Cir. 1988) (quoting ACS Hosp. Sys. v. Montefiore Hosp., 221 USPQ 929, 933 (Fed. Cir. 1984)) (emphasis in original). Neither Myers nor Matsumoto provide any suggestion or incentive to take an analog system (Myers) that fails to disclose a need for a digital integer delay for its proper operation and modify it with digital components (Matsumoto). Thus, any modification of Myers without some suggestion or incentive to do so is improper.

Accordingly, for at least all the above reasons, claims 1-14 are patentable over the prior art of record. It is therefore respectfully requested that the rejection be withdrawn.

Conclusion

All objections and rejections having been addressed, it is respectfully submitted that the subject application is in condition for allowance and a Notice to that effect is earnestly solicited.

Respectfully submitted,



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